INSTRUCTION MANUAL

Type 1237
VHF/UHF
Preamplifier

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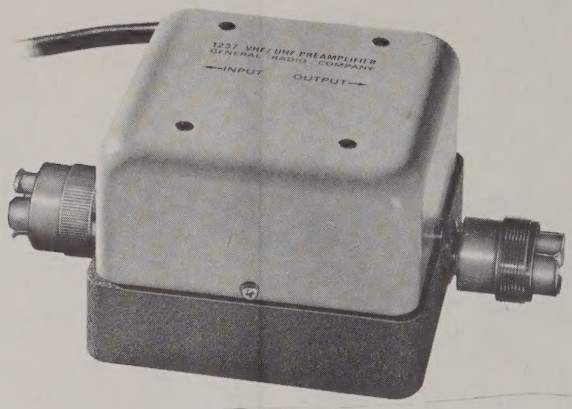
GENERAL RADIO
West Concord, Massachusetts 01781
Form No. 1237-0100-A
ID – B100
August, 1968



specifications

Frequency Range: 150 kHz to 1 GHz.

Gain: >10 dB (see typical curve, figure 1).

Reverse Attenuation: >33 dB; below 700 MHz, >43 dB.

Noise Figure: See typical curve. Figure 1.

Terminals: Input and output, GR874® locking coaxial connectors.

Power Required: 100 to 125 or 200 to 250 V, 50 to 400 Hz, 1.5 W; or 9 V dc, 18 mA.

Dimensions (width x height x depth): 6¼ x 3 1/16 x 2½ in. (160 x 94 x 64 mm).

Weight: Net, 1½ lb (0.7 kg); shipping, 3 lb (1.4 kg).

Catalog Number	Description
1237-9700	**1237 VHF/UHF Preamplifier**

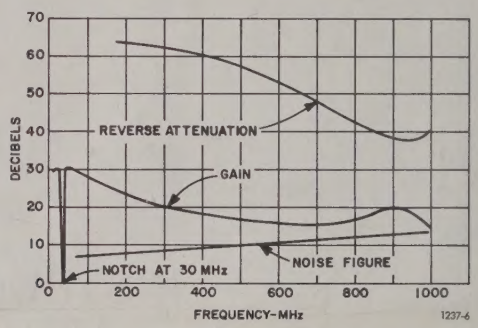
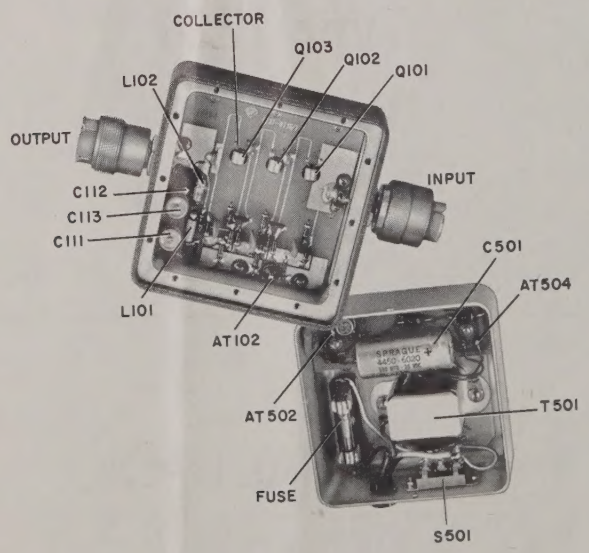


Figure 1. Typical noise figure, gain and reverse attenuation characteristics.



1.1 PURPOSE.

The Type 1237 low noise, low-level, transistor amplifier is designed for use as a general-purpose amplifier or preamplifier and isolator over a 150 kHz to 1 GHz frequency range.

1.2 DESCRIPTION.

The Type 1237 consists of three grounded-emitter amplifier stages, a 30-MHz stopband filter, and a 9-V power supply.

External features of the amplifier are listed in Table 1; typical gain, reverse attenuation, and noise figure curves, as a function of frequency, are shown in Figure 1.

1.3 PRINCIPLES OF OPERATION.

The 30-MHz stopband filter is incorporated to reduce the 30-MHz noise output. The use of the filter results in improved sensitivity when a heterodyne detector with a 30-MHz intermediate frequency is connected to the Type 1237 output. The bandwidth over which the gain is reduced by 10 dB or more is approximately 4 MHz.

The maximum output level is a function of frequency; the output level with a 1-dB gain compression is shown in Figure 2.

The input VSWR of the Type 1237 (referenced to 50 Ω) is typically 4 or less over a frequency range of 50 to 1000 MHz.

TABLE 1

CONTROLS AND CONNECTORS

Name	*Type*	*Function*
INPUT	GR874® Locking Coaxial Connector	Amplifier input
OUTPUT	GR874® Locking Coaxial Connector	Amplifier output
Power Input	Three-terminal male connector	For connection to power line
LINE Switch	Slide switch	Selects transformer connections for 100-125-V or 200-250-V operation

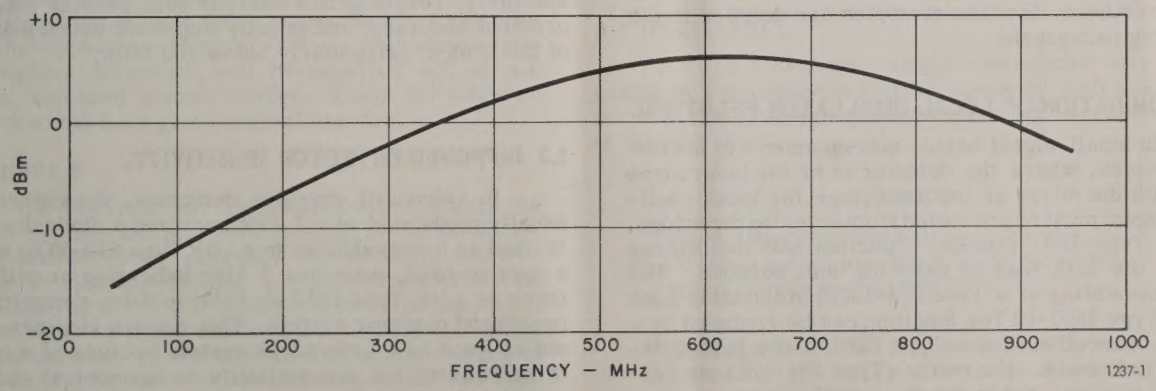


Figure 2. Power output level for a 1 dB gain compression.

OPERATION Section 2

2.1 POWER CONNECTION.

Before connecting the Type 1237 to the ac power source, slide the LINE switch to the correct position (100-125-V or 200-250-V).

2.2 INTERFACE ADAPTORS.

Interface with other equipment supplied by General Radio or other manufacturers is facilitated by the use of GR874 Adaptors. A complete list of available adaptors is included at the end of these instructions.

2.3 BATTERY OPERATION.

The amplifier normally operates from the +9-V supply. For field use, the power supply may be removed and a 9-V battery connected to the filter terminals on the amplifier box.

2.4 FILTER REMOVAL.

If desired, the 30-MHz filter can be easily removed from operation by cutting the strips connecting L102 and C112, and R108 and L101.

APPLICATIONS Section 3

3.1 GENERAL.

The Type 1237 is a generally useful laboratory instrument that can be employed as a sensitivity-improving element in attenuation measurements utilizing the series substitution method, a bridge amplifier, an isolator, a driver for low-power electronic devices, or many others. Specific examples are detailed in the following paragraphs.

3.2 ELIMINATION OF LOCAL-OSCILLATOR FEEDTHRU.

In small-signal bridge measurements of nonlinear devices, where the detector is of the heterodyne type with the mixer as the input stage, the local-oscillator signal must be prevented from entering the bridge. In the Type 1607 Transfer-Function and Immittance Bridge the L.O. trap is used for this purpose. The trap, consisting of a Type 874-LK20 Adjustable Line and a Type 1607-P2 Tee Junction, can be replaced by a direct connection of the Type 1237 to the bridge detector terminals. The mixer (Type 874-MRL or 874-MRAL) is connected to the Type 1237 output.

This application of the Type 1237 simplifies operation of the Type 1607 and eliminates measurement errors caused by local-oscillator feedthrough. Small-signal operation of a semiconductor device under test is assured because of the great reverse loss of the Type 1237. In addition, sensitivity is improved considerably, resulting in a sharper null, greater measurement accuracy, and greatly improved performance of the bridge, particularly below 100 MHz.

3.3 IMPROVED DETECTOR SENSITIVITY.

In video and envelope detectors, the source is usually modulated at a 1-kHz rate and a diode device is used as a demodulator (e.g., GR Type 874-VQ), with a narrow-band, sensitive 1-kHz indicating amplifier (such as a GR Type 1232 or 1234) to form a sensitive, broadband detector system. This system is generally not as good as a heterodyne system because of a lack of selectivity (or susceptibility to harmonics) and is usually about 40 dB less sensitive. Use of the Type

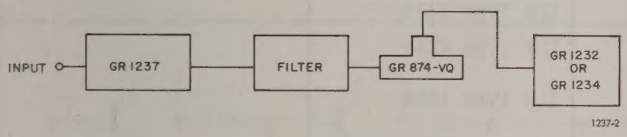


Figure 3. Detector system using the Type 1237.

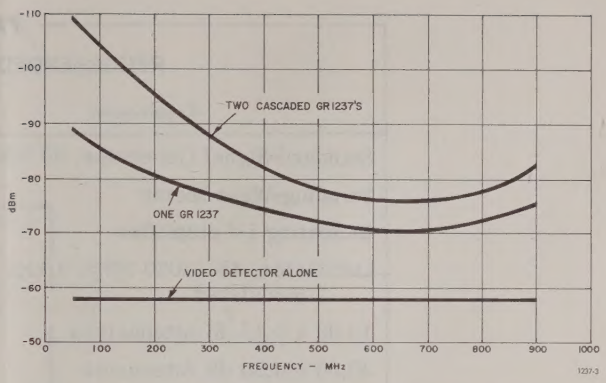


Figure 4. Relative improvement in sensitivity using the Type 1237.

1237 can improve this sensitivity; the system is shown in Figure 3 and the resulting improvement in sensitivity is illustrated in Figure 4.

The susceptibility to harmonics can be reduced by employing a low-pass filter (GR Type 874-F), or a bandpass filter, at the detector input. The resulting detector system can then be used as a substitute for the heterodyne system in applications as a null detector, with the distinct advantage of having no requirement for a local oscillator. The resultant system is simple and easy to use; it is generally sensitive enough for most measurements performed with the Type 1602, 1606, 1607, and 1609 bridges. The dynamic range of the system is limited by the square-law range of the crystal detector.

SERVICE AND MAINTENANCE Section 4

4.1 WARRANTY.

We warrant that each new instrument manufactured and sold by us is free from defects in material and workmanship and that, properly used, it will perform in full accordance with applicable specifications for a period of two years after original shipment. Any instrument or component that is found within the two-year period not to meet these standards after examination by our factory, District Office, or authorized repair agency personnel, will be repaired or, at our option, replaced without charge, except for tubes or batteries that have given normal service.

4.2 SERVICE.

The two-year warranty stated above attests the quality of materials and workmanship in our products. When difficulties do occur, our service engineers will assist in any way possible. If the difficulty cannot be eliminated by use of the following service instructions, please write or phone our Service Department giving full information of the trouble and of steps taken to remedy it. Be sure to mention the serial and type numbers of the instrument.

Before returning an instrument to General Radio for service, please write or phone our Service Department or nearest District Office, requesting a "Returned Material Tag." Use of this tag will ensure proper handling, and identification. For instruments not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay.

4.3 DISASSEMBLY.

Access to power-supply components may be gained by removing the Phillips screw on each side of the amplifier, and separating the upper and lower halves of the amplifier.

CAUTION

When separating the halves, care should be taken not to break the leads from the power supply to the amplifier.

The amplifier itself may be reached by removing the 12 screws on the bottom of the assembly and dropping the cover plate out.

TABLE 2

RECOMMENDED TEST EQUIPMENT

Requirement	*Recommended Type**
Standard-Signal Generator, 30 MHz	GR Type 1003
Standing-Wave Meter	GR Type 1234
Indicating i-f amplifier	GR Type 1236
Oscillator, 450-1020 MHz, 1 kHz modulated	GR Type 1361
10.00 ± 0.15 dB Attenuators	GR Type 874-G10L
20.00 ± 0.30 dB Attenuator	GR Type 874-G20L
Amplitude-Regulating Power Supply	GR Type 1263
Voltmeter Detector	GR Type 874-VQ
50-Ω Termination	GR Type 874-W50BL

*or equivalent.

4.4 MINIMUM PERFORMANCE SPECIFICATIONS.

Conformance to catalog specifications, at incoming inspection or following repair, may be demonstrated by the following tests. Table 2 lists the test equipment recommended for these tests and for calibration.

4.4.1 GAIN AT 30 MHz.

Using a 30-MHz source and a suitable monitoring device, measure a 10-dB maximum gain at 30 MHz under the following conditions: The 30 MHz input voltage must be limited to 3-mV to prevent saturation; and the detector must be insensitive to 30 MHz harmonics (a 30-MHz i-f amplifier is recommended as a detector).

4.4.2 GAIN: 150 kHz TO 1000 MHz.

Using the set-up of Figure 5, measure a 10-dB minimum gain at 650- and 1000-MHz.

4.4.3 LINE VOLTAGE EFFECT ON GAIN.

Vary the input line voltage from 100 to 125 V, with the amplifier operating at 600 MHz. Note that the gain does not vary more than ±0.5 dB.

4.4.4 REVERSE ATTENUATION.

Measure the reverse attenuation, using the gain test set-up, but with the Type 1237 input and output connections reversed; the reverse attenuation should be greater than 33 dB above 700 MHz and greater than 43 dB below 700 MHz.

4.5 CALIBRATION.

STOPBAND FILTER ADJUSTMENT.

Trimmer capacitors C111 and C113 are used to tune the 30-MHz stopband filter. To adjust the filter, connect a 30-MHz signal to the input (1-kHz modulated if a video detector is used as an indicator, CW if a 30-MHz amplifier is used) and adjust the trimmers for minimum output.

DC TEST VOLTAGES.

Table 3 gives test voltages as an aid to trouble-shooting. All voltages are measured with no input signal applied.

TABLE 3

DC TEST VOLTAGES

Test Point	*DC Voltage*
Q101 collector to ground	+5.5 ± 0.3 V
Q102 collector to ground	+5.5 ± 0.3 V
Q103 collector to ground	+5.5 ± 0.3 V
AT502 to ground	+9.0 ± 0.5 V
AT502 to C501 (NEG)	+15 ± 2 V

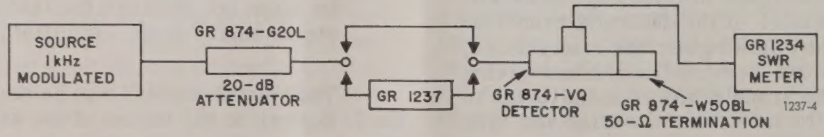
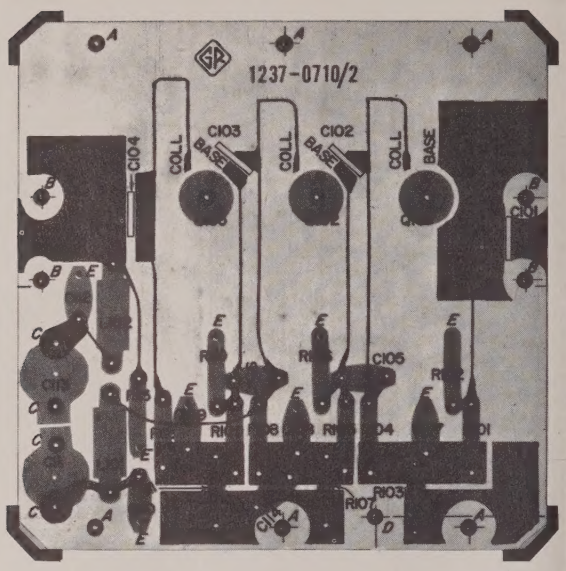


Figure 5. Gain test set-up.

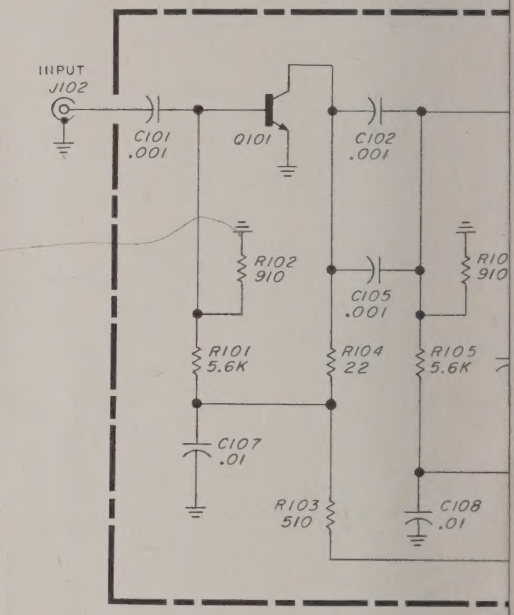
REF. NO.	DESCRIPTION	PART NO.	FED. MFG. CODE	MFG. PART NO.	FED. STOCK NO.
CAPACITORS					
C101	Ceramic, .001 µF 300 V	4400-5700	00656	BC-C1-2-NM	
C102	Ceramic, .001 µF 300 V	4400-5700	00656	BC-C1-2-NM	
C103	Ceramic, .001 µF 300 V	4400-5700	00656	BC-C1-2-NM	
C104	Ceramic, .001 µF 300 V	4400-5700	00656	BC-C1-2-NM	
C105	Ceramic, .001 µF +80% -20% 500 V	4404-2109	72982	831, .001 µF +80 -20%	5910-983-9994
C106	Ceramic, .001 µF +80% -20% 500 V	4404-2109	72982	831, .001 µF +80 -20%	5910-983-9994
C107	Ceramic, .01 µF +80% -20% 50 V	4401-3100	80131	CC61, 0.01 µF +80 -20%	5910-974-5697
C108	Ceramic, .01 µF +80% -20% 50 V	4401-3100	80131	CC61, 0.01 µF +80 -20%	5910-974-5697
C109	Ceramic, .01 µF +80% -20% 50 V	4401-3100	80131	CC61, 0.01 µF +80 -20%	5910-974-5697
C110	Ceramic, 27 pF ±5% 500 V	4404-0275	72982	831, 27 pF ±5%	
C111	Trimmer, 7-25 pF 350 V	4910-2043	72982	538-002 (7-25 pF N300)	
C112	Ceramic, 47 pF ±5% 500 V	4404-0475	72982	831, 47 pF ±5%	
C113	Trimmer, 7-25 pF 350 V	4910-2043	72982	538-002 (7-25 pF N300)	
C114	Ceramic, .001 µF ±20%	4404-2100	72982	831, .001 µF ±20%	
C501	Electrolytic, 500 µF +150% -10% 20 V	4450-6020	37942	TT, 500 µF +150 -10%	
C502	Ceramic, .1 µF +80% -20% 50 V	4403-4100	80131	CC63, 0.1 µF +80 -20%	5910-811-4788
RESISTORS					
R101	Composition, 5.6 kΩ ±5% 1/4 W	6099-2565	75042	BTS, 5.6 kΩ ±5%	5905-691-0195
R102	Composition, 910 Ω ±5% 1/4 W	6099-1915	75042	BTS, 910 Ω ±5%	
R103	Composition, 510 Ω ±5% 1/4 W	6099-1515	75042	BTS, 510 Ω ±5%	5905-801-8272
R104	Composition, 22 Ω ±5% 1/4 W	6099-0225	75042	BTS, 22 Ω ±5%	5905-279-5459
R105	Composition, 5.6 kΩ ±5% 1/4 W	6099-2565	75042	BTS, 5.6 kΩ ±5%	5905-691-0195
R106	Composition, 910 Ω ±5% 1/4 W	6099-1915	75042	BTS, 910 Ω ±5%	
R107	Composition, 510 Ω ±5% 1/4 W	6099-1515	75042	BTS, 510 Ω ±5%	5905-801-8272
R108	Composition, 22 Ω ±5% 1/4 W	6099-0225	75042	BTS, 22 Ω ±5%	5905-279-5459
R109	Composition, 5.6 kΩ ±5% 1/4 W	6099-2565	75042	BTS, 5.6 kΩ ±5%	5905-691-0195
R110	Composition, 910 Ω ±5% 1/4 W	6099-1915	75042	BTS, 910 Ω ±5%	
R111	Composition, 510 Ω ±5% 1/4 W	6099-1515	75042	BTS, 510 Ω ±5%	5905-801-8272
R112	Composition, 22 Ω ±5% 1/4 W	6099-0225	75042	BTS, 22 Ω ±5%	5905-279-4097
R113	Composition, 33 Ω ±5% 1/4 W	6099-0335	75042	BTS, 33 Ω ±5%	
R501	Composition, 20 Ω ±5% 1/2 W	6100-0205	01121	RC20GF200J	5905-279-3520
R502	Composition, 3 kΩ ±5% 1/4 W	6099-2305	75042	BTS, 3 kΩ ±5%	5905-682-4097
TRANSISTORS					
Q101	Type 2N4259	8210-1155	93916	2N4259	
Q102	Type 2N4259	8210-1155	93916	2N4259	
Q103	Type 2N4259	8210-1155	93916	2N4259	
Q501	Type 2N697	8210-1040	82219	2N697	5961-752-0150
DIODES					
CR501	Type 1N3253	6081-1001	79089	1N3253	5961-814-4251
CR502	Type 1N3253	6081-1001	79089	1N3253	5961-814-4251
CR503	Type 1N3253	6081-1001	79089	1N3253	5961-814-4251
CR504	Type 1N3253	6081-1001	79089	1N3253	5961-814-4251
CR505	Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR506	Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR507	Type 1N935	6083-1026	07910	1N935	5960-760-9599
INDUCTORS					
L101	.68 µH ±10%	4300-0505	99800	1537, 0.68 µH ±10%	
L102	.47 µH ±10%	4300-0405	99800	1537, 0.47 µH ±10%	
FUSE					
F501	1/16 A Slo-Blo	5330-0300	71400	MDL, 1/16 Amp	
SWITCH					
S501	Type DPDT, Slide Switch	7910-0831	42190	4603	
TRANSFORMER					
T501		0746-4530	24655	0746-4530	
CONNECTORS					
J101	874 Type	0874-4631	24655	0874-4631	
J102	874 Type	0874-4571	24655	0874-4571	
FILTER					
FL101	.0025 µF	5280-0100	01121	FIB, .0025 µF ±10%	
PLUG					
PL501	Cable power	4200-1900	24655	4200-1900	
CIRCUIT BOARD ASSEMBLIES					
	Power Supply Etched Circuit	1237-2702	24655	1237-2702	
	Preamp Etched Circuit Asm.	1237-2712	24655	1237-2712	

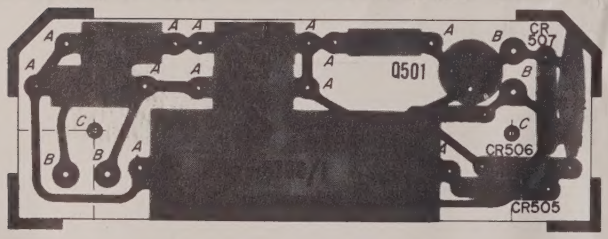


NOTE: The number appearing on the foil side is not the part number of the assembled board. The complete assembly is P/N 1237-2702.

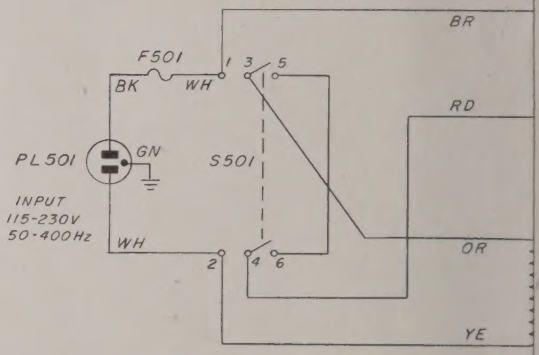
NOTE UNLESS SPECIFIED

1. POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE.
2. CONTACT NUMBERING OF SWITCHES EXPLAINED ON SEPARATE SHEET SUPPLIED IN INSTRUCTION BOOK.
3. REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES APPEARING ON DIAGRAM.
4. RESISTORS 1/4 WATT.
5. RESISTANCE IN OHMS K - 1000 OHMS M - 1 MEGOHM
6. CAPACITANCE VALUES ONE AND OVER IN PICOFARADS, LESS THAN ONE IN MICROFARADS.
7. KNOB CONTROL
8. SCREWDRIVER CONTROL
9. AT - ANCHOR TERMINAL
10. TP - TEST POINT





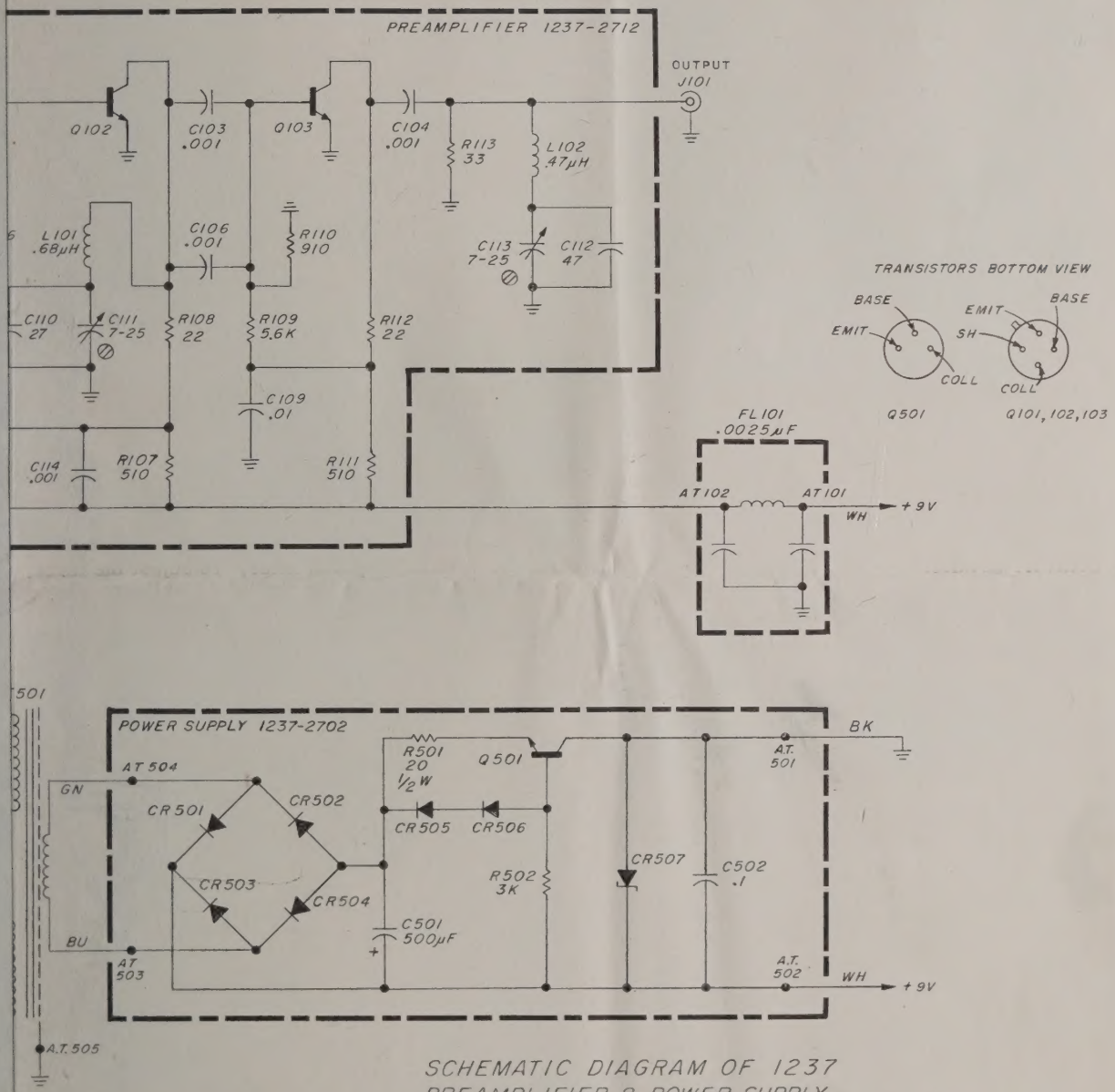
NOTE: The number appearing on the foil side is not the part number of the assembled board. The complete assembly is P/N 1237-2712.



FEDERAL MANUFACTURERS CODE

From Federal Supply Code for Manufacturers Cataloging Handbooks H4-1 (Name to Code) and H4-2 (Code to Name) as supplemented through June, 1967.

Code	Manufacturers Name and Address
00656	Aerovox Corp., New Bedford, Mass.
01121	Allen-Bradley, Co., Milwaukee, Wisc.
07910	Continental Device Corp., Hawthorne, Calif.
24446	G. E. Schenectady, N. Y. 12305
24655	General Radio Co., W. Concord, Mass 01781
37942	P. R. Mallory and Co. Inc., Indianapolis, Ind.
42190	Muter Co., Chicago, Ill. 60638
71400	Bussman Mfg. Div. of McGraw Edison Co., St. Louis, Mo.
72982	Erie Technological Products Inc., Erie, Penn.
75042	IRC Inc., Philadelphia, Penn. 19108
79089	RCA, Commercial Receiving Tube and Semiconductor Div., Harrison, N. J.
80131	Electronic Industries Assoc., Washington, D.C.
82219	Sylvania Electric Products, Inc., (Electronic Tube Div.), Emporium, Penn.
93916	Cramer Products Co., New York, N. Y. 10013



SCHEMATIC DIAGRAM OF 1237
PREAMPLIFIER & POWER SUPPLY

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